Some Remarks upon Professor Kaiser's Investigation of the Errors of a Double-image Micrometer. By William Simms, Esq.

The attention of the Royal Astronomical Society having lately been called to the consideration of the double-image Micrometer by Professor Kaiser, in two communications which have appeared in the *Monthly Notices*, I have been induced to offer a few remarks upon the subject.

In a paper which was read at the Meeting on March 9 last, the Professor has named three sources of error which he detected in the course of his investigations; and here I must beg to be allowed to express my admiration of the amount of ingenuity and perseverance manifested in these researches, and I can fully realise his mortification at the loss of his testing marks after expending so much time upon the observations, having myself been surprised by finding a blank where my marks had previously existed.

Now with regard to the first-named error to be feared.

1. Periodical errors of the micrometer screw.

From the results given in the table at page 195, vol. xxvi. I imagine that the screw has sustained some injury; this might possibly have occurred in the transmission of the instrument abroad (the Professor would not have expended so much time and patience upon an object which he could suspect of having met with an accident); these periodical errors manifest themselves in a manner that would indicate a slight flexure of the screw; it is certain that, as these screws are cut in a very delicate engine, such errors ought not to exist, and the results of the investigations by the Astronomer Royal upon the twin screws of the Reflex Zenith Micrometer show that screws can be made which possess scarcely any sensible inequality.

2. Variability in the mutual distance of the threads of the screw.

This should also be nearly an insensible quantity, but if my surmise of an accidental flexure having occurred should prove correct there would certainly be this error introduced.

3. Distortion of the images.

The Professor has devoted his principal attention to the value of the micrometer scale for different angular distances; now the very numerous observations clearly indicate that the increase in the value of a revolution of the screw with the size of the measured angle is dependent upon the spherical aberration of the concave lens; the converging pencil of light from the object-glass is brought to a very minute disk upon this divided lens, and as one-half of the lens is carried across this point by the screw, it is evident that the resultant image is formed by successive portions of the lens, more and more removed from its centre, and is accordingly influenced by the error arising from its aberration. It will be found at page 202

that the value of a revolution of the screw increases more slowly after a certain degree of separation of the images has been attained; this circumstance appears to perplex the Professor, since he calls special attention to it. I can account for it by supposing that there may be a slight flattening of the curvature of the lens towards its edge, in fact, an approach to the hyperbolic curve; were it possible to make a single lens free from aberration, or to apply a corrected lens here, a perfect screw would give an equal scale to the micrometer. The Astronomer Royal suggested that one-half of the divided lens should be fixed for the sake of simplicity of construction. Those made previously had both segments movable equally in opposite directions by a right and left-handed screw, which were acted upon by a single micrometer head. Professor Kaiser's proposition of making each segment movable by a separate screw would enable the observer to distinguish the error of screw from that introduced by the form of the lens, and give great facility in the investigations which appear to be necessary to give the instrument the minute accuracy which he certainly has shown to be attainable. I think that a scale of equal parts might be applied in the focus of the eye-piece for the purpose of obtaining the instrumental errors; probably a series of notches cut in the edge of a thin piece of metal by a fine screw (like the comb in a reading micrometer), if carefully made, would give a good result; but I do not think any method could compete in accuracy with the very rigorous ordeal adopted by Professor Kaiser.

Charlton, Nov. 2, 1866.

Note by Messrs. De La Rue, Stewart, and Loewy, on the Distribution of Solar-spotted Area in Heliographic Latitude.

In a paper which is now being printed, and which forms the second series of our Researches on Solar Physics, we have investigated the relation between solar activity and the ecliptical longitude of the planets; and as a result we believe that we have discovered a connexion between the behaviour of sun-spots and the longitudes of *Venus* and *Jupiter*.

We have under consideration another branch of this research, which, however, cannot be completed for some time; but, as the results already obtained seem to be of interest at the present moment, we venture to lay them before the Royal Astronomical Society.

Mr. Carrington, it is well known, has given, in his most interesting volume on the Sun, a diagram exhibiting the distribution in heliographic latitude of sun-spots from time to time. Now, if *Venus* and *Jupiter* have an influence on solar activity, it might reasonably be conjectured that, when these